Early Detection Of Bacterial Infections By Electrochemistry

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EARLY DETECTION OF BACTERIAL INFECTIONS BY ELECTROCHEMISTRY

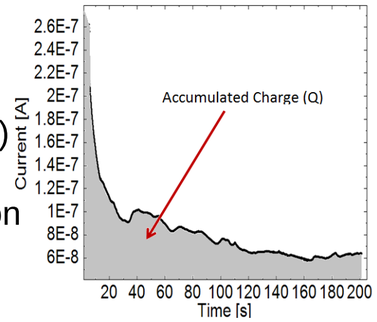
Motivation

Pyocyanin is a redox-active quorum sensing (QS) molecule that is produced by *P. aeruginosa* prior to virulent activity. Detection of pyocyanin can lead to diagnosing patients in risk of developing chronic bacterial infections.

1

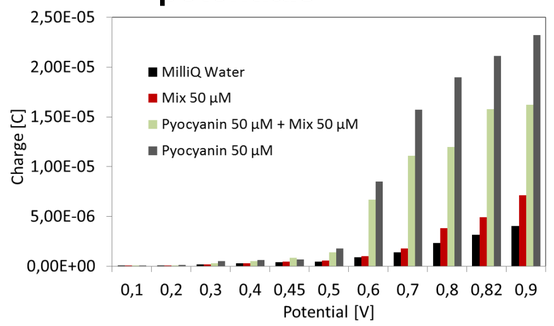
Amperometric detection

Accumulated charge (integral) corresponds to conconcentration of pyocyanin



2

Measurements at different potentials



Concept

Electrochemical detection of pyocyanin is conducted by amperometry using a three-electrode configuration. The inteference from other activity reaches steady state with increasing concentration, thus allowing selective detection.

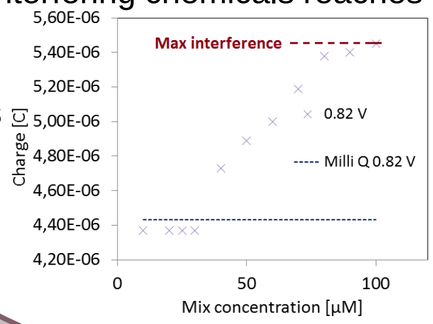
Impact

The electrochemical monitoring of sub-micromolar concentrations of the QS signals enables detection of bacteria before they establish themself chronically. This technique can lead to early diagnosis of chronic bacterial infections and optimize antibiotic treatment strategies.

3

Maximal interference

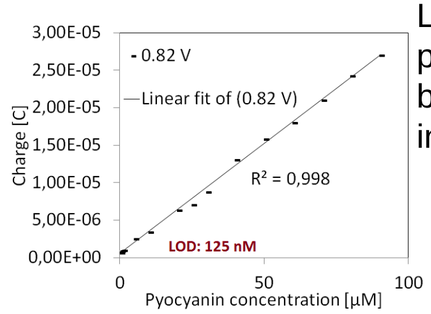
A mixture (mix) of interfering chemicals reaches steady state at relatively high concentrations



4

Selective pyocyanin detection

Linear response of pyocyanin despite background interference



Summary

Selective amperometric detection of the virulence factor pyocyanin is demonstrated due to the unique potential window of pyocyanin. Electrochemical monitoring allows detection of sub-micromolar concentrations which can lead to early diagnosis of chronic bacterial infections.